EPA Region 7 TMDL Review

TMDL ID:	0400	**Waterbody ID:**	MO_0400
Waterbody Name:	WEST FORK SNI-A-BAR CREEK		
Tributary:	W. FK. SNI-A-BAR CR.		
Pollutant:	BOD, VOLATILE SUSPENDED SOLIDS		
State:	MO	**HUC:**	10300101
BASIN:			
Submittal Date:	12/9/2005		
Approved:	Yes		

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

A letter formally submitting this TMDL under Section 303(d) of the Clean Water Act was received December 9, 2005.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The loading capacity for biological oxygen demand (BOD) and volatile suspended solids (VSS) were determined using the QUAL2E water quality model. Ammonia was identified by using best professional judgment. Violations of narrative water quality standards for VSS have been observed in the form of sludge deposits, and dense covering of filamentous algae has also been observed. The City of Lake Lotawana's wastewater treatment plant (WWTP) has been in non-compliance in the past for exceeding existing NPDES permit limits.

BOD loading resulting in violations of the dissolved oxygen (DO) criterion were modeled based upon meeting 5.0 mg/L DO in West Fork Sni-a-Bar Creek which, upon implementation of the WLA concentration-based permit limits, should result in attainment of both narrative and numeric water quality standards (WQS) for the protection of the Warm water Aquatic Life designated use. Additional water quality-based permit limits for ammonia and significantly reduced TSS permit limits will also ensure WQS will be attained.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All WQS, criteria, and beneficial uses have been described. The designated uses of West Fork Sni-a-bar Creek are; Livestock and Wildlife Watering, Warm Water Aquatic Life, and Human Health-Fish Consumption. Warm Water Aquatic Life is the impaired use. The DO standard is listed as 5.0 mg/L. Permit limits for BOD and TSS are 45 mg/L and 80 mg/L, respectively. BOD and ammonia are the parameters modeled to determine the impact the WWTP will cause on DO levels in West Fork Sni-a-Bar Creek; seasonal ammonia criteria were targeted using temperature and pH per the MO WQS. The VSS criteria is narrative, therefore in this TMDL, the target value was derived using best professional judgment due to the fact there is no immediate upstream VSS data which would assist in targeting a natural background concentration. The rationale is provided as an approximate 80% reduction of TSS coming from the WWTP, and ensures no objectionable bottom deposits will occur as a result of the WWTP"s effluent.

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The numeric link between DO, and BOD and ammonia, was generated by the water quality model QUAL2E. Seasonal ammonia criteria were targeted using temperature and pH per the MO WQS. There are no numeric criteria for VSS and there are no natural background concentration data, therefore, it was necessary to rely on best professional judgment and use an 80% reduction of TSS in the WWTP"s effluent.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Land use and soils are described, as well as the history of the area. The sole source of the impairment is the City of Lake Lotawana's WWTP , NPDES permit number MO-0055425. There is a significant forested riparian corridor below the WWTP"s lagoon system to the creek. There is no evidence of point or nonpoint sources of BOD upstream of the WWTP. A WLA study indicates the soils making up the streambed have a high organic content that may increase the BOD. It appears all major sources have been considered.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

The QUAL2E model was calibrated to bring the simulation of flow, velocity, BOD, DO, organic nitrogen, ammonia nitrogen, and nitrate-nitrite nitrogen within the range of measured data for these parameters. The WLAs for BOD and ammonia-N were derived from adjusting the plant discharge in the model to the full design flow of 0.287 cfs, and the estimated instream flow to zero cfs. An additional test was done with the model with the application of winter conditions. Calibration for the QUAL2E model for the existing conditions is based on the current lagoon system. The city is ready to construct a mechanical treatment plant. Waste characteristics of a mechanical plant are different than a lagoon system. A verified model will have to wait until the new plant is constructed to ensure that the State WQS for DO are achieved. The WLA concentrations are identified and will be incorporated into the Lake Lotatwana's WWTP NPDES permit in the next permit reissuance; the construction permit for the Lake Lotawana WWTP construction upgrade from a lagoon system to a mechanical plant was placed on public notice June 24, 2005.

WLA Comment

The WLA"s for the City of Lake Lotawana's WWTP are as follows:

10 mg/L BOD5 - equivalent to 22.53 pounds/day of BOD5;

15 mg/L VSS;

NH3-N (ammonia as nitrogen) is seasonal based upon summer and winter:
Summer May 1 - Oct 31: instream target of 1.4 mg/L NH3-N and 3.15 pounds/day;
Winter Nov 1 - Apr 30: instream target of 2.2 mg/L NH3-N and 4.96 pounds/day.

LA Comment

The load allocation is zero.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is explicit based upon 10% of the load capacity; 2.5 pounds/day BOD, summer ammonia 0.35 pounds/day, and winter ammonia 0.55 pounds/day. The 10% explicit MOS will provide additional protection to the creek since the permit limits are based on a monthly and weekly average instead of a daily maximum.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonal variation is taken into consideration for ammonia as nitrogen and a separate limit calculated for each, summer and winter. Otherwise, the WWTP NPDES permit limits apply year-long.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

The Missouri Dept. of Natural Resources (MDNR) placed this TMDL on public notice from August 26 to September 25, 2005, on MDNR's state website. Groups which received the public notice announcement included the Missouri Clean water Commission, City of Lake Lotawana, stream Team volunteers in the county, area legislators, and others that routinely receive the public notice of NPDES permits. Comments were received from the MEC water Resources. The construction permit for the Lake Lotawana WWTP construction was placed on public notice June 24, 2005.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Permit requirements include sampling the effluent for BOD5, TSS, temperature, oil and grease, fecal coliform and NH3-N. Phase one includes permit requirements for instream monitoring both upstream and at the ¼ - mile mixing zone downstream of the outfall. The permittee will collect ammonia, DO, temperature, and pH samples and other information necessary to assess plant performance and the stream recovery. MDNR will conduct a post construction water quality survey approximately one year after construction completion to determine if the creek is improving.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

The WLA"s are set to meet water quality standards, no reasonable assurances are required of the LA.